PURDUE UNIVERSITY CALUMET

CMS Forward Pixels Geometry Simulation

Neeti Parashar

Purdue University Calumet

Hammond, Indiana, USA

For the CMS Forward Pixel Collaboration

X Pisa 2006 Meeting
Frontier Detectors for Frontier Physics
25 1980-2005

Where to find information

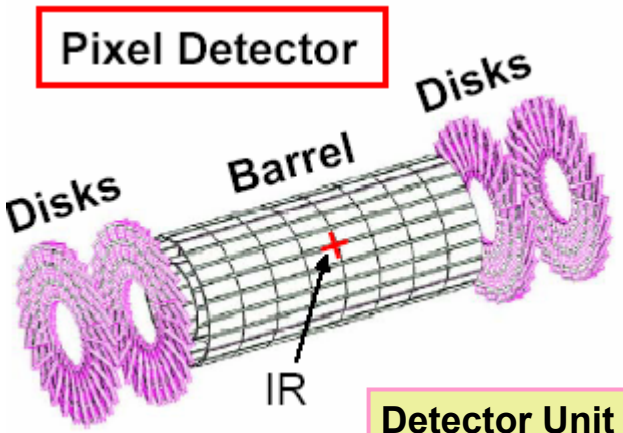
- **B-tau Physics Group**
  - http://cmsdoc.cern.ch/cms/Physics/btau/management/top/btau.html
  - **Tracker Simulation and Geometry**
    - **Coordinators:** **Filippo Ambroglini** (University of Perugia, Italy)
      Neeti Parashar (Purdue University Calumet, USA)
- **Pixel offline group**
  - https://uimon.cern.ch/twiki/bin/view/CMS/PixelOfflineSoftware
    - **Coordinator:** **Vincenzo Chiochia** (University of Zurich)
- **LPC Simulation Group**
  - http://www.uscms.org/LPC/lpc_simul/lpc_simulation.html
    - **Coordinators:** **Daniel Elvira** (Fermilab, USA)
      Harry Cheung (Fermilab USA)

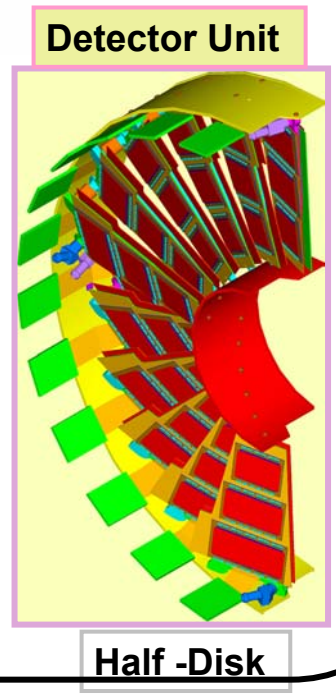
Institutions

- Purdue University Calumet, Indiana, USA
  - Neeti Parashar: Coordinator
  - Vesna Cuplov: Post-doctoral fellow
- Kansas State University, Kansas, USA
  - Dmitry Onoprienko: Post-doctoral fellow
- University of Puerto Rico, Puerto Rico, USA
  - Xingtao Huang: Post-doctoral fellow
- Northwestern University, Illinois, USA
  - Victoria Martin: Post-doctoral fellow
- University of Colorado, Colorado, USA
  - Max Bunce: Graduate student

Forward Pixel Detector

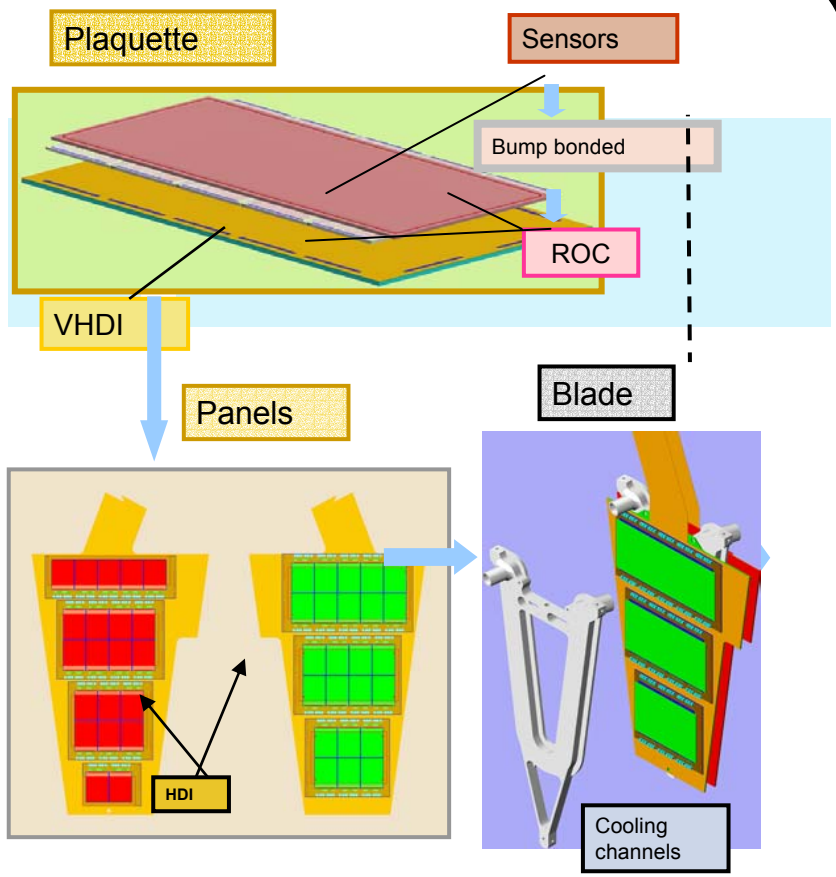
- Complex design
- 4 circular disks (in pink)
- Inner radius = 6 cm
- Outer radius = 15 cm
- η from 1.5 to 2.25
- Each disk includes
  24 wedge shaped blades
  - Turbine like geometry
  - Each blade is rotated 20^0 around their radial symmetry axis to increase charge sharing among pixels
  - Provides a hit resolution of ~ 15 μm



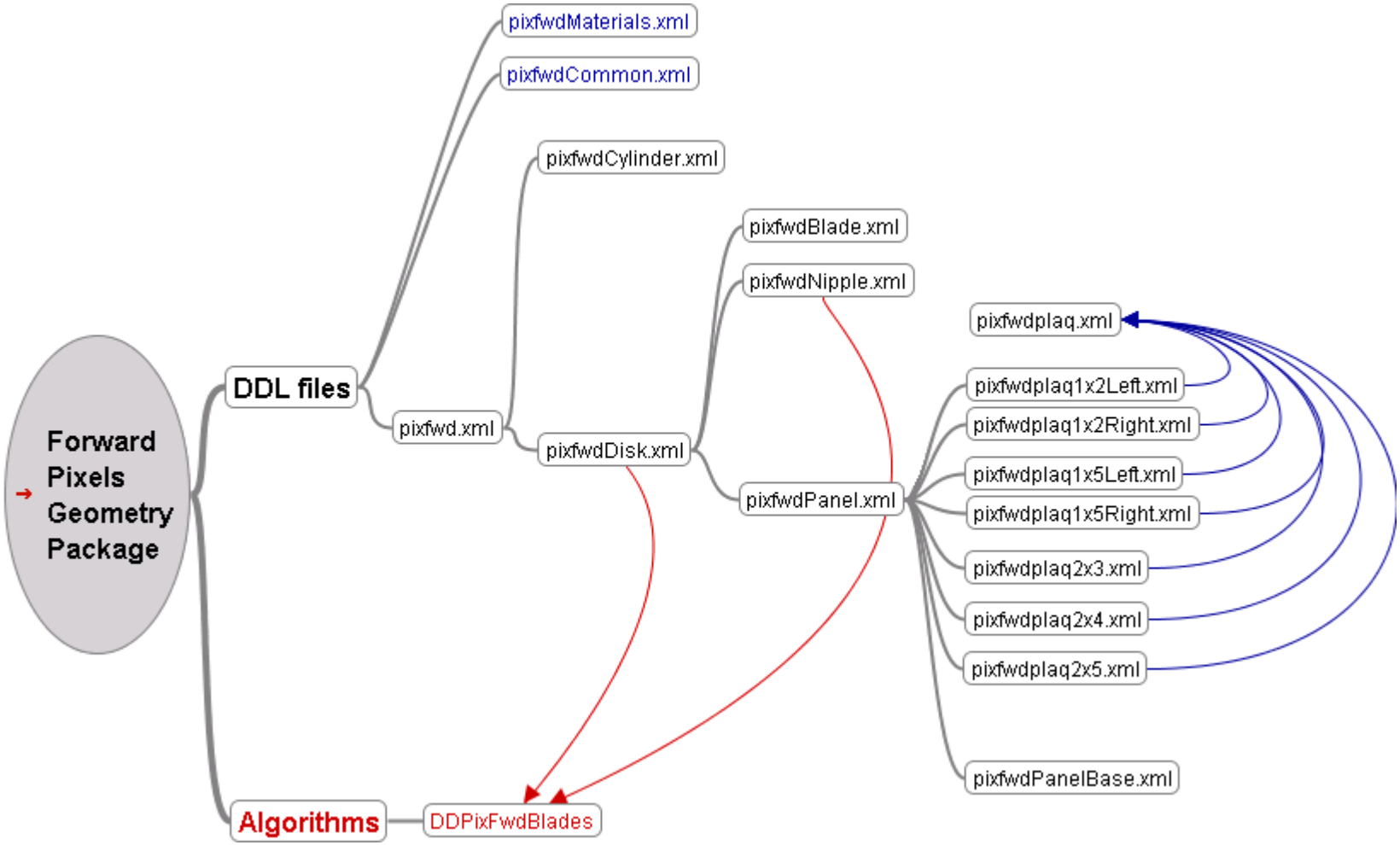


Details of Forward Pixel Disks

- Each blade has a set of 45 readout chips (ROC)
  - 5 different types
    - 1x5
    - 2x5
    - 2x4
    - 2x3
    - 1x2
  - Arranged in 7 different arrays on the two sides of the blade
  - An array of ROCs is bump bonded to a corresponding array of silicon sensors on top of it and thus forms a sandwich



Package Structure



Features

- Replaced old geometry description
- The new geometry is written in XML (eXtensive Markup Language)
- Based on DDD interface (Detector Description Database)
- Conforms to the latest mechanical drawings of the components
- Complete and fully tested successfully for simulation
- In use by the collaboration